

~~sulfide (H₂S) to methane~~ of at least 0.1 moles of hydrogen sulfide per mole of methane, said method comprising the steps of:

reforming a feed stream containing said sour natural gas and steam; by passing said feed stream over a metal-based catalyst chosen to capture sulfur and form ~~from the group of nickel-based reforming catalysts and noble metal-based reforming catalysts and a metal-based catalyst to capture the sulfur by forming a metal sulfide, said metal-based catalyst chosen~~ selected from the group consisting essentially of NiO, Fe₂O₃, MnO, CuO, CoO, CdO and ZnO and mixtures thereof, ~~and Fe₂O₃, MnO, CuO, CoO, CdO and ZnO and mixtures thereof supported on an inert carrier catalyst;~~

regenerating said metal-based catalyst by contacting said metal sulfide formed during the said reforming step with air, ~~the switching between the reforming and the regenerating modes being adjusted so that the heat consumed in the reforming step is balanced by heat liberated in the regeneration step. wherein the amount of heat consumed~~ in said reforming step is balanced by the heat liberated in said regenerating step.

2. (Cancelled).

3. (Currently amended) A method according to claim 1, ~~wherein said reforming catalyst is noble metal based, the sulfur capture catalyst is chosen from the group, NiO MnO, CuO, CoO, CdO and ZnO, and wherein said~~ the sour natural gas has a ratio at least 0.3 moles of hydrogen sulfide per mole of methane.

4. (Currently amended) A method according to claim 1, wherein a continuous stream of syngas is produced by repeatedly cycling multiple reactors between said reforming, and regenerating steps.

5. (Currently amended) A method according to claim 4, 1, wherein said reforming catalyst and regenerating steps use a nickel-based catalyst ~~and~~ sulfur capture catalyst ~~are the same nickel-based material, wherein the reforming and regenerations step are carried out at a temperature of at least 7500°C, wherein the pressure during the reforming step is at least 100 atmospheres, and wherein SO₂ is removed from the vitiated air produced in the regeneration step by passing said vitiated air through a bed of CaCO₃.~~

6. (Currently amended) A method according to claim ~~5~~ 1, wherein said regenerating step produces vitiated air containing SO₂, said SO₂ being removed in a further step of passing said vitiated air over a fluidized ~~said bed of CaCO₃ is fluidized, operated at a pressure of between 3 and 10 atmospheres. at a pressure in the range of 3 to 10 atmospheres and used to generate power via a gas turbine.~~

7. (New) A method according to claim 1, wherein the pressure during said reforming step is at least 100 atmospheres ~~and wherein SO₂ is removed during said regeneration step by passing SO₂ through a bed of CaCO₂.~~

8. (New) A method according to claim 1, wherein said metal-based catalyst is supported on an inert carrier catalyst.

9. (New). A method according to claim 1, wherein said metal-based catalyst is NiO and said reforming step includes a first phase wherein said NiO is reduced to Ni,

said CH_4 is reformed to produce hydrogen and CO, and said H_2S reacts with NiO to produce NiS and ~~hydrogen~~ H_2O .

10. (New). A method according to claim 1, wherein said metal-based catalyst is NiO and said reforming step includes a second phase wherein substantially all of the NiO is reduced to Ni and the composition of the output gas from said reforming step changes from CO_2 and H_2O to an equilibrium mixture of hydrogen, H_2O , CO, CO_2 and CH_4 .

11. (New). A method according to claim 1, wherein said metal-based catalyst is NiO and said regenerating step includes a first phase wherein said air reacts with the Ni formed during said reforming step to form NiO.

12. (New). A method according to claim 1, wherein said metal-based catalyst is NiO and said regenerating step includes a second phase wherein said air reacts with NiS to form SO_2 and NiO.